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Table of Contents

- *Topics of Interest URLs*
- *NSF PPAPG Webinar Overview*
- *Key Documents for NSF Broader Impacts*
- *Defining and Supporting Your Premise*
- *Federal Strategy for STEM Ed and Its Impact on Writing a Proposal's Educational Narrative*
- *Planning for Proposals Addressing National Water Research Priorities*
- *What is an Innovation Ecosystem at NSF?* ***(Reprinted from September 15, 2015)***
- *Research Grant Writing Web Resources*
- *Educational Grant Writing Web Resources*
- *Agency Research News*
- *Agency Reports, Workshops & Roadmaps*
- *New Funding Opportunities*
- *About Academic Research Funding Strategies*

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Topics of Interest URLs

(Back to Page 1)

Enough with the "Learning Styles" Already!
NSF Gen-4 ERC webinar slides
NSF's Hispanic-Serving Institution Program
NSF Scaling Up STEM Diversity Efforts with INCLUDES Network
See the ERC webinar slides and watch a video of the webinar with closed captioning
Companion Guidelines on Replication and Reproducibility in Education Research
Rigor, Reproducibility, and Transparency in NIH Research
NSF Collaborations With Federal Agencies and Others
NSF, NASA announce commitments to support White House strategic plan on STEM education
Charting a Course for Success: A Federal Strategy for STEM Education
Changes to the R15 Academic Research Enhancement Award (AREA), and Introducing the R15 Research Enhancement Award Program (REAP)
Dear Colleague Letter: Seeking Community Input for International Research Experiences for Graduate Students
Interagency Report Charts Ten-Year Vision for Ocean Science and Technology
Working Together to Protect the Integrity of NIH-funded Research
Decoding NIH Grant Numbers
Dear Colleague Letter: STEM Workforce Development Utilizing Flexible Personal Learning Environments
The Office of Behavioral and Social Sciences Research (OBSSR) Strategic Plan 2017-2021
NIFA Fact Sheet
Gulf Research Program Opens New Funding Opportunity to Advance Safety Culture in the Offshore Oil and Gas Industry
A colleague included plagiarized material in your grant proposal. Are you liable?
Curbing Climate Change and Sustainably Supplying Food, Water, and Energy Among Top Challenges
Environmental Engineering Can Help Address, New Report Says
New IAP Report Urges Reliance on Science to Develop Sustainable Food and Agricultural Systems
NIH, Fogarty receive funding increase for Fiscal Year 2019
FY19 Guidelines for Brownfields Assessment Grants
Lauren Alexander Augustine Appointed to Lead Gulf Research Program
NEA Literature Fellowships - Creative Writing in Prose (Fiction and Creative Nonfiction) and Poetry
NIH: Initiative for Maximizing Student Development (IMSD) (T32)
Future Water Priorities for the Nation Directions for the U.S. Geological Survey Water Mission Area (2018)
Environmental Engineering in the 21st Century: Addressing Grand Challenges
Environmental Engineering in 21st Century Presentation Slides
USDA National Water Quality Program
Proposal & Award Policies & Procedures Guide (PAPPG), January 2019
Webinar - Updates to the NSF Proposal & Award Policies & Procedures Guide (PAPPG)
The POLICY OFFICE in the Division of Institution and Award Support is responsible for developing, implementing and issuing proposal and award policy at NSF
An 'epic scientific misadventure': NIH head Francis Collins ponders fallout from CRISPR baby study
Frequently Asked Questions (FAQs) for NSF 19-503, Gen-4 Engineering Research Centers (ERC) Solicitation
Higher education research and development expenditures increased 4.7 percent from FY2016 to FY2017
Science and Engineering for Grades 6-12
NSF - CBMS Regional Research Conferences in the Mathematical Sciences
Doctorate Recipients from U.S. Universities: 2017
Characteristics of College Graduates, with a Focus on Veterans
Understanding the Economics of Microbial Threats: Proceedings of a Workshop
Doctorate Recipients from U.S. Universities: 2017 Data Tables

URLS CONTINUE NEXT PAGE

Short Courses on Innovative Methodologies and Approaches in Behavioral and Social Sciences (RFA-OD-19-012)
Frequently Asked Questions (FAQs) for Improving Undergraduate STEM Education: Hispanic-Serving Institutions (HSI) Program
How NSF helps make and keep America a global leader
Assigning a Value to Teamwork
Always Check Your FOA for New Related Notices 30 Days Before Submission
Can My Application be Considered a Resubmission Even if I am Not Re-Submitting to the Same FOA?
Review of the Edwards Aquifer Habitat Conservation Plan: Report 3
NIH trying to change science culture, boost women's role
Dear Colleague Letter: Request for Information - Integration Institutes for Cross-cutting Biology
Dear Colleague Letter: Supporting Transition to Practice Supplemental Funding Requests in the NSF Cyber-Physical Systems and Smart and Connected Communities Programs
NSF EArly-concept Grants for Exploratory Research on Artificial Intelligence AI and Society - prospectus
Small and isolated habitat patches crucial to species survival
Visions into Voyages for Planetary Science in the Decade 2013-2022: A Midterm Review
Top global health research stories of 2018 from Fogarty and NIH
New funding data available in World Report mapping tool
Astro2020 Decadal Survey Shifts into Gear
Trump Administration Takes Aim at National Climate Assessment
Quantum Computing: Progress and Prospects
Comments Welcomed on the Draft Report Recommending How to Reduce Administrative Burden in Research with Laboratory Animals: A Next Step in Implementing the 21st Century Cures Act
New NIH Financial Conflict of Interest Training Module Available
FY 2019 Ruth L. Kirschstein National Research Service Award (NRSA) Stipends, Tuition/Fees, and Other Budgetary Levels
New Funding Opportunities for Basic Experimental Studies Involving Humans
FY19 Fiscal Policies for Grant Awards: Funding Levels, Salary Limits, and Stipend Levels
Higher Education Research and Development: Fiscal Year 2017
Higher Education R&D Expenditures Increased 4.7%, Exceeded $75 Billion in FY 2017
Dear Colleague Letter: STEM Workforce Development Utilizing Flexible Personal Learning Environments
Frequently Asked Questions (FAQs) for Improving Undergraduate STEM Education: Hispanic-Serving Institutions (HSI) Program
Frequently Asked Questions (FAQs) for NSF 19-503, Gen-4 Engineering Research Centers (ERC) Solicitation
Weekend reads: Is science self-correcting?; peer review's "undue emotional burdens;" retractions at Science
Google's DeepMind aces protein folding
Graduate Research Training Initiative for Student Enhancement (G-RISE) (T32)
Collaborations of Consequence: NAKFI's 15 Years Igniting Innovation at the Intersections of Disciplines

NSF PPAPG Webinar Overview

By Mike Cronan, co-publisher
(Back to Page 1)

Those who frequently watch federal agency webinars specific to a program solicitation may conclude that this task is best accompanied by a few Red Bull energy drinks to avoid nodding off. Many federal agency webinars consist of listening to presenters reading a funding solicitation verbatim followed by a fair number of questions about the solicitation from those who have not read it.

But this changed with the November 27 Webinar - Updates to the NSF Proposal & Award Policies & Procedures Guide (PAPPG) by Jean Feldman, Head, Policy Office, Division of Institution and Award Support, within the NSF's Office of Budget, Finance, and Award Management. This presentation was given by an NSF Webinar Rock Star! In place of a monotonous, verbatim reading from the new Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 19-1), Feldman filled an energetic hour with helpful comments, insights, and observations on and about the PAPPG and even described where NSF is going in this realm. If only more webinars were like this one, they would be looked forward to with eagerness rather than dread by those whose job it is to know and pass on this information. That said, the webinar will be posted in the near future to the above webinar website. It is well worth viewing in its entirety.

This PAPPG will become effective on January 28, but in anticipation of that date, the webinar focused on the significant changes and clarifications to the PAPPG, many nicely illustrated during the webinar. A brief summary follows:

- The Directorates of Geosciences, Biological Sciences, and Engineering now have **no deadlines for core programs**. However, Resubmission has been revised to establish that NSF programs that accept proposals at any time **may** set guidelines in which a declined proposal is deemed ***ineligible for resubmission for a specified period of time***. This came about from cases wherein NSF declined a "no deadline" core proposal only to have it resubmitted several days after it was declined, something the agency felt was an end run around the spirit of the process.
- It is clear from comments during the webinar that **Research.gov** **is the future**; if you are not there yet, you had best get there in order to take advantage of its robust performance, especially related to comprehensive compliance checks. For example, NSF Proposal Preparation and Submission has been updated to provide information about the modernization of the proposal preparation functionality in Research.gov. The new coverage specifies that the ***on-screen instructions in Research.gov may differ from instructions stated in the PAPPG and that, when they do, the on-screen instructions must be followed***. Moreover, Research.gov has over 100 more compliance checks than FastLane, and more are being added. This greater number of checks can signal a problem with a proposal, and thereby benefit the PI in correcting any problems. A clear take away from this webinar: ***Start using Research.gov***.

- NSF will not tolerate sexual harassment by **any** grant personnel, not just the PIs. The NSF Policy on Sexual Harassment and Other Forms of Harassment, or Sexual Assault, has been supplemented with new NSF coverage regarding harassment that implements NSF Important Notice No. 144. This policy articulates that NSF will not tolerate sexual harassment, other forms of harassment, or sexual assault within the agency, at awardee organizations, **or anywhere NSF-funded science and education are conducted**. See NSF spells out new sexual harassment policy: Talk to us; NSF announces new measures to protect research community from harassment; NSF: Next steps against harassment; NSF Director Frances Córdova statement on harassment.
- NSF will not tolerate research misconduct. Understanding the protocols and procedures of the Office of Inspector General (OIG) to enforce integrity in agency operations, including in the proposal narrative related to plagiarism, is critical. For example, the OIG now also scans unfunded proposals in search of research misconduct, which includes plagiarism and violation of attribution standards. The Responsible Conduct of Research (RCR) section of the PAPPG has been supplemented with language encouraging faculty training in the responsible and ethical conduct of research. This training must address writing the research narrative to avoid plagiarism and it explains the attributions required in the Project Description. Moreover, the OIG Semiannual Report to Congress is replete with examples of research misconduct that have resulted in sanctions, including jail time (Semiannual Report March 2018 (OIG-SAR-58)). Specifically (emphasis added) "NSF expects strict adherence to the rules of proper scholarship and attribution. The responsibility for proper scholarship and attribution rests with the authors of a proposal; all parts of the proposal should be prepared with equal care for this concern. ***Authors other than the PI (or any co-PI) should be named and acknowledged***. Serious failure to adhere to such standards can result in findings of research misconduct. ***Research misconduct refers to fabrication, falsification, or plagiarism in proposing or performing research funded by NSF***, reviewing research proposals submitted to NSF, or in reporting research results funded by NSF."
- Dear Colleague Letters (DCLs), has been revised to address an expanded use of the DCL. They ***may now also be used to announce NSF's interest*** in receiving proposals in specified topical areas via the following types of proposals: Rapid Response Research (RAPID); Early-concept Grants for Exploratory Research (EAGER); Research Advanced by Interdisciplinary Science and Engineering (RAISE); and Conference.

While this article briefly summarizes the webinar, it will be worth your time and effort to check for the streaming of the November 27 webinar. It will be posted here: Webinar - Updates to the NSF Proposal & Award Policies & Procedures Guide (PAPPG). It was a very well presented webinar rich with complementary commentary that will be useful to research offices and faculty alike.

Key Documents for NSF Broader Impacts

By Mike Cronan, co-publisher
(Back to Page 1)

The recently published document Companion Guidelines on Replication & Reproducibility in Education Research (November 28, 2018), subtitled *Supplement to the Common Guidelines for Education Research and Development, A Report from The National Science Foundation and The Institute of Education Sciences, U.S. Department of Education*, is a follow-on to the 2013 report by NSF and IES Common Guidelines for Education Research and Development. **See the 1-page graphical summary of the 2013 report HERE by EvaluATE**. The 2013 report was grounded on the 2002 National Academies Report Scientific Research in Education. Also, the recently released Science and Engineering for Grades 6-12 Investigation and Design at the Center (2018), available as a free pdf download from National Academies Press, and the companion 2012 NAP report A Framework for K-12 Science Education Practices, Crosscutting Concepts, and Core Ideas complement the above reports.

These reports bear directly on several STEM educational domains with one group likely to benefit from them significantly--faculty submitting proposals to NSF. Many of these applicants may be struggling with how best to address Broader Impacts or develop educational components to research proposals, from ERC's to CAREERS. Faculty who are not struggling with this are either experienced and well-funded NSF PIs, or, unfortunately, researchers new to NSF who are not yet aware of the NSF culture and the importance it places on integrating research and education, particularly as they are manifested in Broader Impact requirements.

Moreover, even experienced NSF PIs may not be keeping abreast of the agency's emphasis on evidence-based best practices: ***replicability and reproducibility*** of BI and other educational proposal components at various scales and across multiple institutional types, and increasingly rigorous evaluation protocols. ***Research offices supporting faculty*** play a key role in communicating newly published reports, such as those above that complement and expand NSF's expectations about what makes for a compelling Broader Impacts or other educational narrative in a research proposal.

NSF BI or required educational components of research proposals were never intended to transform researchers into educational specialists K-16. Rather, the intent is to leverage the research activities and the research context in a way that benefits those other domains related to BI and to developing a diverse and inclusive 21st century scientific and engineering workforce, among many other possible objectives. However, the conundrum for many researchers is that the competitive configurations of BI and educational components of research proposals are not static but a continuously evolving research domain that NSF reviews have found to be effective.

The bottom line here is that ***researchers should not be expected to become experts or research transfer agents*** in the evolving programmatic characteristics and best practices related to BI and other educational components of research proposals. Keep in mind that ***proposals with an excellent BI section but otherwise undistinguished research will not be funded*** (i.e., the research does not advance the field in some significant way, the research is incremental rather than transformative, there are no compelling value-added benefits to the

research, the research is not convergent, etc.). ***So before BI comes into play, an excellent research proposal must lead the way.*** After all, BI and educational activities based on undistinguished research is a nonstarter.

The most competitive and strategic way to address this is to have one or more points of contact in research offices that keep informed on the best BI and educational practices, e.g., by reviewing reports such as those noted above. These points of contact must then work with faculty when a specific requirement for meeting a BI criteria exists. Also, keep in mind, as NSF often notes, "BI does not have to be K-to-gray." As the PAGGG notes, for example, BI can be the impact of the research itself—on the field, on society, etc.

However, in most cases, researchers will need support to design BI activities that are educational in nature and typically address K-16. This support may be advice on best practices, successful models, evidence-based activities, evaluation protocols, logic models, etc. Moreover, some of the best advice research offices can offer PIs on BI and educational components to projects will consist of guiding researchers in leveraging existing educational infrastructures, education centers, existing outreach activities, established partnerships with school districts and teachers, etc. Most researchers are eager for and appreciative of research offices that can help them plan, develop, and write a strong BI section of the proposal, or a specific section of the proposal related to educational activities that makes sense in the context of their proposed research.

In the end, researchers are not going to have the time to read through or even quickly skim important reports on BI and STEM education issued by the National Academies, NSF, or other associations. So research offices that maintain a current state of knowledge about these topics and can use them to guide faculty can contribute deeply to the funding success of researchers they support. Keeping current is a key component of this service to faculty. This can be done by reading the above noted reports to a level of detail permitting a deeper dive into the topic when particular faculty may need it. At a minimum, one or more people in a research office should serve as a point of contact on BI issues by remaining aware of advances in the field and of key points in the published documents as described below.

As noted in the 2013 report (emphasis added): "Each year, the National Science Foundation (NSF) and the U.S. Department of Education (ED) make substantial investments in education research and development. Through these efforts, the agencies seek to improve opportunities to learn science, mathematics, engineering, and technology (STEM) and to increase student achievement, engagement and persistence in those areas. ED also supports research and evaluation in a range of areas other than STEM.

Though complementary, the agencies' focus areas in education research differ in ways that correspond to their respective roles in government and society. NSF, which is charged with increasing the quality and amount of science and engineering research in a variety of contexts, has ***emphasized basic research on STEM learning, cognition, and development of instructional approaches, technologies, and materials in both formal and informal settings***. In contrast, ED ***concentrates its investments on developing and testing the effectiveness of well-defined curricula, programs, and practices that could be implemented by schools***. The complementary missions of the agencies, along with the continuing urgency of improving American students' STEM knowledge and skills, form the backdrop for the evidence guidelines and study types described in this document."

As noted in the above 2018 supplement report specific to the 2013 report (emphasis added): "In the intervening period, the education research community and federal policymakers have been ***increasingly attentive to the role of, and factors that promote and inhibit, replication and reproducibility of research.*** In order to build a coherent body of work to ***inform evidence-based decision making***, there is a need to increase the visibility and ***value of reproducibility and replication studies among education research stakeholders***. The purpose of this companion to the Common Guidelines is to highlight the importance of these studies and provide ***crossagency guidance on the steps investigators are encouraged to take to promote corroboration, ensure the integrity of education research, and extend the evidence base***. The companion begins with a brief overview of the ***central role of replication*** in the advancement of science, including definitions of key terminology for the purpose of establishing a common understanding of the concepts. The companion also addresses the challenges and implications of planning and conducting reproducibility and replication studies within education."

Finally, keeping current on BI best practices is neither onerous nor time consuming but it does require research offices to pay sufficient attention to ensure that faculty don't spend a lot of time "spinning their wheels on BI," or, as NSF has often said, "reinventing the flat tire."

Defining and Supporting Your Premise

By Lucy Deckard, co-publisher
(Back to Page 1)

A proposal's premise is the foundation on which the entire edifice of the proposal is built. NIH has placed increased emphasis on the importance of defining and supporting a proposal's premise, but no matter what funder you're applying to, it's important to explain and support your premise.

What is a Premise?

When you develop hypotheses or research questions, or even when you propose a project that takes advantage of a new opportunity, your project idea rests on previous results or evidence in some form. To take a hyperbolic example, it might be observed that the ***rates of chocolate allergies in children are 50% lower in northern U.S. states than in southern states***. Based on that observation, I hypothesize that cold weather is protective against chocolate allergies, and I have hypotheses for the mechanisms by which that might happen. My ***premise*** is that rates of chocolate allergies are lower in northern states. I am not proposing to test that assertion; I'm accepting that as fact and am basing my entire project on that fact. If this premise rests solely on the results of one study that had methodological flaws, it could turn out that rates of chocolate allergies are not, in fact, significantly lower in northern states. In that case, the foundation of the entire project I'm proposing has been invalidated.

You can see that this is a scenario that reviewers and funders emphatically wish to avoid. It's therefore critical that PIs clearly identify their premise, explain why there is ample evidence to support that premise, and discuss any weaknesses or limitations in that evidence. This is especially a point of concern for NIH since investigations have found that a significant percentage of expensive research projects, especially clinical trials, have turned out to be based on flawed premises. In other words, the research results that justified those clinical trials turned out to be flawed. As a result millions of dollars of taxpayers' funds were spent on clinical trials of interventions that did not pan out and, in retrospect, were not justified.

NIH's Policy on Scientific Rigor

NIH and the Agency for Healthcare Research Quality (AHRQ) have announced that, beginning with applications due on January 25, 2019, the application instructions and review criteria will replace the term "scientific rigor" with the term "rigor of the prior research," focusing especially on research that is relevant to the validity of your premise. NIH now directs PIs to "Describe the scientific premise for the proposed project, including consideration of the strengths and weaknesses of published research or preliminary data crucial to the support of your application." If there are significant weaknesses in a prior research study, you should consider whether it's appropriate to include that data in your application. (See NOT-OD-18-228 for details).

How to Address this Requirement in Your Application

No matter which funder you're applying to, the validity of your premise will be of utmost

concern to the reviewers. If they don't buy your premise, there's little chance they'll recommend that your project be funded. Often the problem is that the PI has not even articulated what the premise is, but has instead treated the premise as received knowledge. Remember that your reviewers may not be experts in your particular topic, and what may be obviously true to you may not be so obvious to your reviewers. For this reason, it's a good idea to explicitly state your premise and discuss the evidence for its validity. If there are potential weaknesses or questions related to that evidence, discuss those as if you were in the room with the review panel. Why do you still think the premise is valid, even taking into account the limitations or weaknesses in the evidence to support your premise? Also, take care not to omit reported research results that are relevant to your premise. If you don't mention such research, reviewers will assume you weren't aware of it, and this will hurt your application. By clearly stating and supporting your premise, you will ensure that reviewers are onboard for the rest of your proposal.

Other Resources

Open Mike: Scientific Premise in NIH Grant Applications

BioScience Writers: NIH Requirements for Scientific Premise

A Federal Strategy for STEM Education and Its Impact on Writing a Proposal's Educational Narrative

By Mike Cronan, co-publisher

(Back to Page 1)

The past month has delivered a goldmine of relevant information in the form of reports from federal agencies and the National Academies. These reports will help researchers write more competitive Broader Impacts and educational component sections to research proposals to NSF as well as to other federal funding agencies (see the BI companion article in this issue). For faculty and the research offices that support them, two recent announcements provide invaluable information on understanding the long-term priority STEM education goals and implementation strategies of federal research agencies.

The first is the NSF partnership announcement NSF, NASA announce commitments to support White House strategic plan on STEM education in support of the NSF INCLUDES National Network, a program dedicated to making a lasting impact on **diversifying** the STEM workforce of the future. Partners include the National Aeronautics and Space Administration (NASA), National Institute of Standards and Technology (NIST), National Oceanic and Atmospheric Administration (NOAA), and U.S. Geological Survey (USGS). This announcement includes new funding opportunities and new federal agency collaborations that will support this STEM workforce effort. To learn more about NSF INCLUDES, visit NSF's 10 Big Ideas Special Report.

The second announcement is the 48-page December 2018 report Charting a Course for Success: A Federal Strategy for STEM Education, a five-year federal agency strategic plan that lays out the federal government's role in furthering STEM education by working with state and local stakeholders, the education community, and American employers. ***Its goals include building a STEM-competent citizenry, creating a STEM-ready workforce, and removing barriers to STEM careers, especially for women and underrepresented groups***.

This report sets out a Federal agency strategy for the next five years "based on a **Vision** for a future where **all Americans will have lifelong access to high-quality STEM education and the United States will be the global leader in STEM literacy, innovation, and employment**." The report offers rich detail that will benefit anyone writing proposals to NSF and other federal agencies that require an educational component, a plan for developing the scientific workforce of the future, or proposals that focus entirely on STEM education at various levels.

This 48-page report contains a lot of detailed information, but its heart describes ***three strategic national goals and four pathways to success.*** Researchers writing proposals with educational components to NSF or other agencies, or assisting those who do, will gain a **significant competitive advantage** by **demonstrating in the proposal narrative how the proposed educational objectives map to the strategic goals and objectives of this report**, which are quite extensive. Keep in mind **you are not mapping to everything** in the report, but more likely to one or a few subsets of goals relevant to the context of the proposed research and/or the specific educational objectives. ***Basically, applicants want to reflect sufficient***

alignment with the report's goals to claim that their proposal advances or impacts them in some important way.

Moreover, keep in mind that following the release of major federal agency reports such as this one, NSF and other federal agencies, will ***begin aligning new funding opportunities to reflect the long-term strategic objectives of the report***, something already happening in the above noted NSF/NASA collaboration. Furthermore, demonstrating the alignment of educational objectives with those of the report is not a difficult task given that the below three strategic goals are general and overarching, offering researchers an opportunity to describe educational details that will match one or more of the strategic goals.

For example, Goals 2 and 3 related to diversity and STEM workforce are commonly integrated together in most NSF proposals and the four noted pathways to success, particularly strategic partnerships, are already common to successful proposals. **Bottom line:** these goals and pathways help the applicant focus on the priority objectives of federal agencies funding STEM education and make sure they are addressed in the proposal narrative. Essentially, the report gives excellent insight into where federal research agency dollars will be committed over the coming years in support of STEM education and therefore can help researchers define their educational objectives within that context.

As the report notes, the strategic vision will be achieved by pursuing three goals and four pathways to success, each enumerated below:

1. **"Build Strong Foundations for STEM Literacy** by ensuring that every American has the opportunity to master basic STEM concepts, including computational thinking, and to become digitally literate. A STEM-literate public will be better equipped to handle rapid technological change and will be better prepared to participate in civil society.
2. **Increase Diversity, Equity, and Inclusion in STEM** and provide all Americans with lifelong access to high-quality STEM education, especially those historically underserved and underrepresented in STEM fields and employment. The full benefits of the Nation's STEM enterprise will not be realized until this goal is achieved.
3. **Prepare the STEM Workforce for the Future**—both college-educated STEM practitioners and those working in skilled trades that do not require a four-year degree—by creating authentic learning experiences that encourage and prepare learners to pursue STEM careers. A diverse talent pool of STEM-literate Americans prepared for the jobs of the future will be essential for maintaining the national innovation base that supports key sectors of the economy and for making the scientific discoveries and creating the technologies of the future."

This federal agency strategy for STEM education is built on the following ***four pathways to success*** representing a cross-cutting set of approaches to achieving the above three goals (each supported by a set of priority ***objectives***):

1. **"Develop and Enrich Strategic Partnerships** to cultivate new or strengthen existing connections between educational entities and the broader communities they serve.
2. **Engage Students where Disciplines Converge** using STEM as an interwoven and complex pursuit that blends disciplines and makes STEM learning meaningful and inspiring.

3. **Build Computational Literacy** through STEM education heavily imbued with computational skills and accessed through digital means.
4. **Operate with Transparency and Accountability** within Federal agencies implementing this plan, using evidence-based practices and assessments that can be emulated by other STEM stakeholders."

Finally, the report deserves a close reading, which will help researchers glean more specificity and detail about the strategic thinking underpinning its contents. As a result, those who read the report carefully will become better able to make a compelling case that the proposed educational sections of their research narrative or the entire narrative of an educational proposal are worthy of funding based upon how they impact and advance STEM education.

Planning for Proposals Addressing National Water Research Priorities

By Mike Cronan, co-publisher
(Back to Page 1)

University researchers who seek funding for water projects from any of a multitude of public and private sources are distributed across most university colleges and departments. These can range from engineering and agriculture, to the geosciences and sciences, to mathematics and computer modeling, to programs in policy and the social and behavioral sciences. Moreover, Federal agencies supporting water-related research include NSF, USDA/NIFA, EPA, NOAA, NASA, DoD, and DOE (e.g., DE-FOA-0001905: Energy-Water Desalination Hub), among others. This intersection of a myriad of university-based disciplines with investments in water research and the numerous federal agencies that support water-related research in an ongoing and significant way represents a major external funding source for universities. This funding opportunity merits providing faculty with the strategic planning needed successfully to pursue these funds.

A good starting point for looking at water issues can be found in the recent 110-page publication *Future Water Priorities for the Nation, Directions for the U.S. Geological Survey Water Mission Area, Committee on Future Water Resource Needs for the Nation*: Water Science and Research at the U.S. Geological Survey **by the National Academies of Sciences, Engineering, and Medicine**. Like all National Academy Press reports, this document is available as a **free pdf download** at the above URL.

As noted in the report (emphasis added): "Over the next 25 years, growing populations, climate change, aging water-related infrastructure, and the ***demands of agriculture, industry, and energy production*** and use will increase the need for and threaten the available quantity and quality of water supplies. Next-generation tools and technology and ***collaboration at multiple levels*** will be needed to understand changes to the water environment and determine how society can ensure clean, safe, and ample water for all uses."

This National Academies report identified the following (**bulleted below**) water science and resource challenges (emphasis added), which are global in scope and encompass many interrelated issues. As is often the case, National Academy reports such as this ***drive future funding directions at federal research agencies and result in funding solicitations that address the research challenges raised in the report***. For faculty and research offices alike, this report offers information on likely future water-related funding solicitations motivated by its contents. It also provides an invaluable listing of numerous research topics areas through which researchers will address these challenges and thereby implicitly identify the disciplinary areas across colleges and departments where funding opportunities for faculty will become most likely.

Familiarity with the below research challenges will help research offices assist faculty by better fitting faculty interests to possible funding opportunities and evolving water research priorities across federal agencies. This is especially important to new and more junior faculty

who may be seeking guidance for mapping their research capacities and expertise to possible funding sources, as suggested by the below challenges enumerated in the report.

- "Understanding the role of water in the Earth system: As water moves through the atmosphere, lithosphere, and biosphere, it facilitates physical, chemical, and biological processes. ***Understanding how the water cycle responds and feeds back to global change remains a key challenge in Earth system research***.
- Quantifying the water cycle: Effective ***management of water resources*** demands knowledge of the amount of water available, its state, and its location. ***Quantification of the hydrologic cycle*** is exceedingly difficult because the stocks, flows, and residence times of water vary spatially and temporally.
- Developing integrated modeling: ***Models are essential tools for integrating and synthesizing disparate observations***, for understanding complex interactions and testing hypotheses, and for reconstructing past conditions and predicting future trajectories of co-evolving systems.
- Quantifying change in the socio-hydrological system: Managing these resources in the United States and globally will require an ***understanding of how human activities influence water resources***. Securing ***reliable and sustainable water supplies***: Society depends upon the availability of clean, reliable, and affordable surface water and groundwater for drinking water, food and energy production, industrial activities, healthy ecosystems, and recreational activities and tourism.
- Understanding and ***predicting water-related hazards***: Water-related hazards represent some of the world's costliest natural disasters in both economic and human terms and are increasingly exacerbated by human activities and climate change."

Within the context of the above challenges, the report poses ten key questions (**enumerated below**), with priority focus given to the first five, as noted below. While these key questions indicate a research and funding allocation roadmap for the Water Mission Area of USGS and Water Science Centers over the next 25 years, keep in mind that USGS, in partnership with states, is not a major funder of water research in the context of all federal funding for water across numerous other federal agencies such as NSF and USDA/NIFA. Moreover, the report itself is global in context. As in the above listing of challenges, the below questions suggest the disciplinary domains that can answer the posed questions, particularly as related to what will likely be a convergent research ecosystem needed to address these complex, water-related scientific questions.

For example, many research intersections can be identified between the USDA's AFRI-Water for Agriculture Challenge Area and the AFRI Water for Food Production Systems Challenge Area, as well as between these two areas and the Hydrologic Sciences at NSF and other agencies. The following list of questions can illuminate these intersections:

1. "What is the quality and quantity of atmospheric, surface, and subsurface water, and how do these vary spatially and temporally?
2. How do human activities affect water quantity and quality?
3. How can water accounting be done more effectively and comprehensively to provide data on water availability and use?

4. How does changing climate affect water quality, quantity, and reliability, as well as water-related hazards and extreme events?
5. How can long-term water-related risk management be improved?"
6. How does the hydrologic cycle respond to changes in the atmosphere, the lithosphere, and the biosphere through Earth's history and in the near future? And how do the hydrologic responses feed back to and hence accelerate or dampen the changes in the atmosphere, the lithosphere, and the biosphere?
7. How can short-term forecasting for climate, hydrology, water quality, and associated social systems be improved?
8. How do institutions and governance and institutional resilience impact the quantity and quality of water?
9. How can understanding of the connections between water-related hazards and human health be improved?
10. How can competing uses for water resources be managed and maintained to sustain healthy communities and ecosystems in a changing world?"

The take away here, particularly for research offices, is that the enumerated challenges and questions in this report lay out what is essentially a ***strategic research plan for funding success in water research at federal agencies over the coming years***. Each of these challenges and questions is addressed in much greater detail in the 110-page report, but the key information summarized herein is the starting point to funding success. Once these challenges and questions are mapped to the water research expertise of faculty, the foundation of a strategic plan for water research funding can begin to emerge, with the challenges and questions pointing the way.

What does NSF mean by "Innovation Ecosystem"?

By Lucy Deckard, co-publisher
(Back to Page 1)

The term "innovation ecosystem" is popping up everywhere in NSF solicitations. NSF's current Engineering Research Centers (ERC) solicitation states that the a key feature of an ERC should be ***creation of an innovation ecosystem***. ERC applicants must provide a strategic plan for innovation ecosystem development as well as "legal frameworks" for engagement with industry stakeholders. To understand what NSF means by this term, you need to look beyond the dictionary. As with many NSF requirements, PIs need to understand the history, motivation, and expectations behind this criterion in order to develop a strong plan to address them.

What does NSF really mean by these terms? Where did this requirement come from? What have previous awardees done to address this requirement? What is the theory behind innovation ecosystems? Below, we'll provide an overview of the answers to these questions and direct you to resources that can help you to develop a comprehensive understanding of the body of thought underlying this term.

What is an Innovation Ecosystem?

Agencies are increasingly using the term "ecosystem" to refer to the complex environment, networks, policies and culture and actors influencing a process or quality of interest; thus, we're seeing references to innovation ecosystems, regional economic ecosystems, and learning ecosystems. In a report entitled "The Role of the National Science Foundation in the Innovation Ecosystem," released in August 2010 by the NSF Directorate of Engineering, they define the process of innovation as "the introduction of new or significantly improved products (goods or services), processes, organizational methods and marketing methods in internal business practices or the market place." This process, couched in fundamentally economic terms, requires 1) creation of new inventions, 2) translation of those inventions into products or processes that can be commercialized, and 3) commercialization and marketing of those new or improved products or processes. The innovation ecosystem is the combination of policies, infrastructure, connections and actors that allows that process to happen.

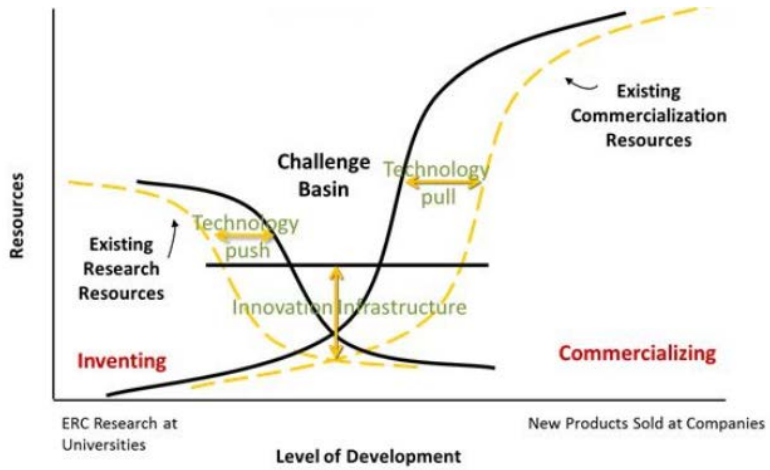
The idea of an innovation ecosystem originated in economic circles to describe regions such as the Silicon Valley where geographic proximity of university researchers, start-up companies, larger industry, investors and a large highly skilled workforce created a synergistic, interconnected environment that stimulated high rates of innovation and economic growth. Innovation ecosystems depend on: 1) technological development and innovation, and 2) entrepreneurship and commercialization. In the original formulation by economists who viewed innovation ecosystems principally through the lens of entrepreneurship, a regional innovation ecosystem was composed of three groups: finance, human capital, and industrial infrastructure. However, economists did acknowledge that universities are usually centers of these regional innovation ecosystems.

NSF, other research funders, and universities have focused more on the technological development and innovation part of the equation. They view the innovation ecosystem in terms of a research economy coupled to a commercial economy, with the goal being to ensure a "virtuous cycle" in which innovations from the research economy feed into the commercial economy, which then feeds profits resulting from those innovations back into the research economy. The challenge is to promote that synergistic connection when, in practice, universities, national labs and industry are often separated by a host of policy, cultural, logistical, and economic barriers. (For a comprehensive discussion on this topic, see "What is an Innovation Ecosystem" by Deborah Jackson)

What is an Innovation Ecosystem Supposed to Do?

While NSF has always emphasized creation of new knowledge and inventions, it is increasingly focusing on moving new discoveries to the marketplace, i.e., "translational research," particularly in Center-level programs. Chapter 5 of the ERC Best Practices Manual provides a helpful discussion on the role of innovation ecosystems. In that chapter, they show how they hope an innovation ecosystem can transform the familiar "Valley of Death" that new inventions often fail to traverse into a less daunting "Challenge Basin" (see figure below).

The innovation ecosystem does this by connecting the actors (e.g., researchers, small businesses, investors, industry), infrastructure (e.g., shared facilities, legal services, multi-institutional centers), policies (e.g., IP sharing, non-disclosure agreements, memoranda of understanding), and resources (e.g., funding) needed to promote transfer of technology to the market place.



NSF's depiction of how an Innovation Ecosystem can transform the "Valley of Death" into the "Challenge Basin." (from the ERC Best Practices Manual and originally from D. Jackson, "What is an Innovation Ecosystem?")

How can we develop an Innovation Ecosystem?

As one might expect from the term "ecosystem," connections and collaboration are key to establishing a strong innovation ecosystem. Key steps to building an innovation ecosystem are:

- Establish activities, processes, and infrastructure that promote interactions, communication, and collaboration among academic researchers, students, small businesses, industry, national lab researchers who are conducting work relevant to the technical focus or application of your innovation ecosystem.
- Engage organizations that can facilitate collaborations, provide infrastructure and contacts, and contribute knowledge and experience (which NSF calls "innovation facilitators"), such as university entrepreneurship programs, venture development organization, state economic development organizations, and business incubators.
- Develop policies and procedures that reduce barriers to collaboration and sharing of innovations. Chief among these is establishing intellectual property (IP) policies and procedures that incentivize research and collaboration, are not onerous in terms of time and effort, are clear and predictable, and balance the needs of the collaborating parties. Clearly, this needs be done at the institutional level and will require some time and the backing of top administrators. Section 5.3.2 of the ERC Best Practices Manual provides a thorough discussion of IP issues.

Of course, each of the above steps is a huge challenge in itself and could encompass myriad activities. When looking for information on what strategies seem to work best and mistakes to avoid, the ERC Best Practices Manual is a good place to start. Individual ERC websites are also a good place to look to find out what others are doing. Scholarly publications on innovation ecosystems, promoting collaborations among academia and industry, and commercializing new technology can also provide helpful information. Some references are provided at the end of this article.

Examples of recommendations for connecting with industry are: 1) When promoting interactions among your students and industry, try to structure your program to encourage on-going and frequent interactions rather than, for example, only annual presentations at a meeting; 2) Including industry researchers on thesis committees and arranging student internships at collaborating companies can be quite effective; and 3) A strong, involved Industry Advisory Board can not only provide guidance on how to better prepare students to work in industry, but Advisory Board members can become champions for your university and its research at their companies.

Preparing the Groundwork

Seeing the emphasis innovation ecosystems and translational research, especially in larger grants and Centers, universities and faculty teams can position themselves to compete for those grants by developing the collaborations, partnerships and policies that will be needed to establish an innovation ecosystem on which they can draw when developing projects.

- Connect with researchers in your area from other institutions, including institutions outside of academia such as national labs and research institutes.

- Find out what your institution's IP policies are and, at the institutional level, work to make them clear and conducive to partnering with business to conduct and translate research.
- Develop collaborations not only with large companies but also with small and start-up technology-oriented businesses. (SBIRs, STTRs and other grants that can help with this process are listed at the end of this article.)
- Get to know organizations in your area that are devoted to promoting economic development and innovation. A resource that can be helpful is the Regional Innovation Accelerator Network website, which includes an interactive locator map to help you find Venture Development Organizations in your region.
- Work with education researchers to explore new approaches to encourage increased creativity and innovation in your students, and encourage connections among your students and industry collaborators.
- Offer training for technical personnel in the industry with which you hope to collaborate.

Take advantage of funding programs that can help you in these activities:

Small Business Innovation Research Grants (SBIR) – multiple agencies
Small Business Technology Transfer Grants (STTR) – multiple agencies
NSF Industry/University Cooperative Research Centers (I/UCRCs)
NSF Grant Opportunities for Academic Liaison with Industry (GOALI)
Partnerships for Innovation: Accelerating Innovation Research
Engineering Research Centers (ERC)
I6 Challenge (EDA partnering with NSF, DOE and other agencies)
NSF Research Coordination Networks
National Research Traineeships (NRT)

More resources:

Jackson, Deborah J., What is an Innovation Ecosystem?" National Science Foundation, Arlington, VA, 2012

Jukka Viitanen, Markku Markkula, Carlos Soler, Systemic Development of Regional Innovation Ecosystems: Modernizing the Triple Helix. Knowledge Triangle: Reinventing the Future, 2013

Auerswald, P. E., and L. M. Branscomb. 2003. Valleys of death and Darwinian seas: financing the invention to innovation transition in the United States, Journal of Technology Transfer. 28:227–239.

EERE Industrial Technologies Program, "Stage-Gate Innovation Management Guidelines: Managing Risk through structured project decision-making," Feb. 2007

Kenneth Smith, Building and Innovation Ecosystem: Process, Culture and Competencies, Industry and Higher Education, 20: 4, Aug. 2006 pp 219-224.

Research Grant Writing Web Resources

(Back to Page 1)

Type of NSF Funding Video by Dr. Jean Feldman

NSF Proposal Preparation Presentation

- Find Funding Opportunities
- Proposal and Award Policies and Procedures Guide
- Types of Proposal Submissions
- Sections of an NSF Proposal
- Postdoctoral Mentoring Plans
- Data Management Plans

NSF Merit Review Process Presentation

- Program Officer Review
- Proposal Review Criteria
- Types of Reviews
- Becoming a Reviewer
- Managing Conflicts of Interest
- Funding Decisions

Dear Colleague Letter: Leadership-Class Computing Allocations

Powerful new computing and data analytics capabilities are enabling novel discoveries and advances in knowledge not otherwise possible, which are in turn contributing to enhanced economic competitiveness and increased national security. Researchers in many areas of science and engineering (S&E) are pursuing innovative computational techniques to advance our understanding of the natural world, such as by substantially increasing the resolution of computer simulations and expanding the use of predictive data-driven models derived from large experimental data sets often from disparate sources. As a result, advanced computational instruments with powerful computation and data analytics capabilities have become fundamental tools in S&E research.

With this Dear Colleague Letter (DCL), the National Science Foundation (NSF) invites supplemental requests for access to leadership-class computing resources to enable progress on fundamental S&E research that would otherwise not be possible. Two NSF leadership-class computing resources, Blue Waters and Frontera, will be available for allocation with an award start date of April 1, 2019, as described below.

Blue Waters is one of the most powerful academic supercomputers in the world. It is deployed at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign (UIUC). Blue Waters is a Cray XE system with over 22,000 AMD processors and 4,000 NVIDIA Graphics Processor Units (GPUs). The system also has significant memory and storage capabilities. More information about the system can be found at https://bluewaters.ncsa.illinois.edu/blue-waters-overview. The Blue Waters system will continue full operations through December 2019.

Principal Investigators (PIs) with active NSF awards and a compelling need for significant computation requirements to solve grand challenge problems in S&E are invited to submit supplemental funding requests for allocations on Blue Waters. NSF anticipates 125 million node hours will be available for allocation as supplements to active NSF awards for the period April through December 2019, and further anticipates these node hours will be distributed among five to six such supplemental funding requests with clearly justified goals for solving significant grand challenge research problems in any S&E domain.

NSF's Proposal and Award Policies and Procedures Guide (PAPPG) provides specific guidance on preparing supplemental funding requests (see Chapter VI.E.4). NSF anticipates supplemental funding requests pursuant to this DCL may include as part of their budgets up to $15,000 to support travel for technical coordination with the Blue Waters team.

Educational Grant Writing Web Resources

(Back to Page 1)

Enough with the "Learning Styles" Already!

IES Announces New Companion Guidelines on Replication and Reproducibility in Education Research

The Institute of Education Sciences (IES), in collaboration with the National Science Foundation (NSF), has released the ***Companion Guidelines on Replication and Reproducibility in Education Research***. The Companion Guidelines highlight the importance of replication and reproducibility studies and provide guidance on the steps researchers can take to promote corroboration, ensure the integrity of research, and extend the evidence base. This document is a supplement to the ***Common Guidelines for Education Research*** released in 2013, that 1) defines the types of ED- and NSF-funded research that relates to the development and testing of interventions and strategies designed to increase learning, 2) specifies how the types of research relate to one another, and 3) describes the theoretical and empirical basis needed to justify each research type. Check out IES's Resources for Researchers for more information. Read the **Inside IES Research Blog**: *Companion Guidelines on Replication and Reproducibility in Education Research,* to find out more about the relevance of these guidelines to education research.

Graduation Rates for Selected Cohorts, 2008-13; Outcome Measures for Cohort Year 2008; Student Financial Aid, Academic Year 2015-16; and Admissions in Postsecondary Institutions, Fall 2016: First Look (Provisional data)

Description: This First Look is a revised version of the preliminary report released on October 12, 2017. It includes fully edited and imputed data from the Integrated Postsecondary Education Data System (IPEDS) winter 2016-17 data collection, which included four survey components: Graduation Rates for selected cohorts 2008-2013, Outcome Measures for cohort year 2008, Student Financial Aid data for the academic year 2015-16, as well as Admissions for Fall 2016. selected cohorts 2008-2013, Outcome Measures for cohort year 2008, Student Financial Aid data for the academic year 2015-16, as well as Admissions for Fall 2016.

Science and Engineering for Grades 6-12

It is essential for today's students to learn about science and engineering in order to make sense of the world around them and participate as informed members of a democratic society. The skills and ways of thinking that are developed and honed through engaging in scientific and engineering endeavors can be used to engage with evidence in making personal decisions, to participate responsibly in civic life, and to improve and maintain the health of the environment, as well as to prepare for careers that use science and technology.

The majority of Americans learn most of what they know about science and engineering as middle and high school students. During these years of rapid change for students' knowledge, attitudes, and interests, they can be engaged in learning science and engineering through schoolwork that piques their curiosity about the phenomena around them in ways that

are relevant to their local surroundings and to their culture. Many decades of education research provide strong evidence for effective practices in teaching and learning of science and engineering. One of the effective practices that helps students learn is to engage in science investigation and engineering design. Broad implementation of science investigation and engineering design and other evidence-based practices in middle and high schools can help address present-day and future national challenges, including broadening access to science and engineering for communities who have traditionally been underrepresented and improving students' educational and life experiences.

Science and Engineering for Grades 6-12: Investigation and Design at the Center revisits *America's Lab Report: Investigations in High School Science* in order to consider its discussion of laboratory experiences and teacher and school readiness in an updated context. It considers how to engage today's middle and high school students in doing science and engineering through an analysis of evidence and examples. This report provides guidance for teachers, administrators, creators of instructional resources, and leaders in teacher professional learning on how to support students as they make sense of phenomena, gather and analyze data/information, construct explanations and design solutions, and communicate reasoning to self and others during science investigation and engineering design. It also provides guidance to help educators get started with designing, implementing, and assessing investigation and design.

New WWC Webinar: How Administrators Can Communicate the Need for Evidence-Based Decision Making

On December 12, the What Works Clearinghouse hosted a webinar on how WWC resources can support use of high-quality research evidence in decision making. The webinar will covered the following:

- The need for high-quality research that has been vetted by experts;
- An overview of the WWC resources and how different WWC evidence levels are designated;
- Strategies that administrators can use to effectively identify and select relevant sources within the WWC; and
- Recommendations for sharing relevant research and additional WWC resources with teachers and other staff in easily understandable ways.

Though educators understand importance of using research evidence to inform decision making, many K-12 teachers and district administrators struggle to incorporate research into their practice. Several factors contribute to this challenge, including limited access to relevant research, lack of time to find and review research, and lack of training on research methods and statistics. While administrators may want to share more research evidence with school- and district-level staff, they need clear, engaging, and actionable resources to increase research use. This webinar explained how the WWC provides resources to support communication and decision making.

Agency Research News

(Back to Page 1)

Dear Colleague Letter: STEM Workforce Development Utilizing Flexible Personal Learning Environments

The National Science Foundation (NSF) seeks new proposals and supplemental funding requests to existing awards that support flexible personalized learning to prepare the science, technology, engineering and mathematics (STEM) workforce of the future. NSF envisions projects that collectively apply to all learners, from young children to those already in the workforce. In particular, we would like to support research that complements an anticipated future funding opportunity made possible by a gift from the Boeing Corporation, which was announced on September 24, 2018.

The Boeing gift established a partnership between NSF and Boeing to accelerate training in crucial skill areas for the future U.S. workforce. It will be used to support design, development, implementation, and analysis of online courses in model-based engineering, model-based systems engineering, mechatronics, robotics, data science and sensor analytics, program management, and artificial intelligence. These courses will use personalized learning systems to maximize their effectiveness for diverse learners.

There will be two parallel funding opportunities to support STEM workforce preparation. One will be made possible by the Boeing gift and the other involves the efforts funded in response to this Dear Colleague Letter (DCL). For the opportunities in response to this DCL, NSF seeks proposals that will broadly inform development of personalized learning systems or generalize the research results generated during the deployment of online courses. This could be accomplished either by using the data generated by those systems or by studying the systems themselves. NSF encourages innovative educational research and development proposals that will help the nation educate the STEM workforce of the future. NSF invites proposals to existing programs listed below and requests for supplemental funding to existing awards that engage a convergent science approach. Such an approach often benefits from interdisciplinary teams representing multiple fields. Such teams can make learning a convergent experience and accomplish learning goals that are not otherwise achievable.

Dear Colleague Letter: Request for Information - Integration Institutes for Cross-cutting Biology

The National Science Foundation's Directorate for Biological Sciences (BIO) seeks ideas from the community on fundamental biological research questions and topics that are poised for major advances. Ideally these ideas would span multiple levels of organization in living systems and require expertise from diverse biological subdisciplines. This is a call, not for research proposals, but for high-level ideas. The deadline for submissions is **March 1, 2019.**

Biology is unified by the goal of understanding the processes that sustain life and enable biological innovation across all levels of organization, from molecular to global scales. However, the field of biology has become increasingly fragmented into sub-disciplines over the past decades due, in part, to advances that enable deep study of narrowly defined problems. Emerging and mature technologies deliver high-resolution data at every scale, opening new

avenues for cross-cutting discoveries in biology but also leading to additional levels of specialization. Creative integration of diverse sub-disciplines at this stage could significantly enhance our ability to tackle ambitious, fundamental biological questions — potentially re-unifying biology.

To address this challenge, BIO envisions the creation of "Integration Institutes" to support collaborative teams of researchers at a level not feasible in most existing core programs and over a more extended timeframe than is typical of standard NSF awards. These Institutes will enable research and training in a truly integrated environment, preparing the next generation of biological scientists to pursue discipline-spanning research throughout their careers.

BIO seeks suggestions about the types of questions and resources the community envisions would benefit from such NSF investment. There is no funding directly associated with this call; however, this input will be used to inform strategies for supporting a number of Integration Institutes over the next several years.

WHO SHOULD RESPOND: U.S.-based scientists should respond with ideas about biological challenges best suited for investigation across biological scales, as described above.

HOW TO RESPOND: In responding to this call, please consider the following questions:

- **What fundamental biological research question is poised for breakthroughs by collaboration across biological subdisciplines? Why is this question important?**
- **Why is now a particularly good time to address this question?**
- **What types of resources, in terms of expertise and infrastructure, would facilitate answers to this question?**

To respond, send a Word document of no more than 2 pages to BIO-RFI-II@nsf.gov, with the Subject line "RFI: Integration Institutes Response to DCL". On all submissions, include the author's name(s), organizational affiliation, and contact email. Proprietary information should not be included in the submissions. All submissions will be analyzed by a task force from all divisions of BIO to identify the most exciting and transformative ideas from the community. Inquiries may be directed to BIO-RFI-II@nsf.gov.

Dear Colleague Letter: Supporting Transition to Practice Supplemental Funding Requests in the NSF Cyber-Physical Systems and Smart and Connected Communities Programs

Through this Dear Colleague Letter (DCL), the National Science Foundation's (NSF) Directorate for Computer and Information Science and Engineering (CISE) wishes to notify the community of its intention to support **Transition to Practice (TTP) supplemental funding requests for active awards funded through its Cyber-Physical Systems (CPS) and Smart and Connected Communities (S&CC) programs**. Funded TTP supplements will provide support for periods of up to two years. Supplemental funding requests may not exceed more than one-third of the original award amount or $400,000, whichever is less.

Foundational research is transforming engineered systems and driving innovation in a wide variety of application domains, thereby enabling new levels of economic opportunity and growth, safety and security, health and wellness, and overall quality of life in the Nation's local communities. With this DCL, NSF is inviting supplemental funding requests for high-impact TTP activities that can enable on-going CPS or S&CC projects to go beyond their original, planned research activities.

Foundational research is transforming engineered systems and driving innovation in a wide variety of application domains, thereby enabling new levels of economic opportunity and growth, safety and security, health and wellness, and overall quality of life in the Nation's local communities. With this DCL, NSF is inviting supplemental funding requests for high-impact TTP activities that can enable on-going CPS or S&CC projects to go beyond their original, planned research activities.

Agency Reports, Workshops & Research Roadmaps

(Back to Page 1)

Protecting Participants and Facilitating Social and Behavioral Sciences Research

Institutional review boards (IRBs) are the linchpins of the protection systems that govern human participation in research. In recent years, high-profile cases have focused attention on the weaknesses of the procedures for protecting participants in medical research. The issues surrounding participants protection in the social, behavioral, and economic sciences may be less visible to the public eye, but they are no less important in ensuring ethical and responsible research.

This report examines three key issues related to human participation in social, behavioral, and economic sciences research: (1) obtaining informed, voluntary consent from prospective participants: (2) guaranteeing the confidentiality of information collected from participants, which is a particularly challenging problem in social sciences research; and (3) using appropriate review procedures for "minimal-risk" research.

Protecting Participants and Facilitating Social and Behavioral Sciences Research ***will be important to policy makers, research administrators, research sponsors, IRB members, and investigators***. More generally, it contains important information for all who want to ensure the best protection—for participants and researchers alike—in the social, behavioral, and economic sciences.

Biodefense in the Age of Synthetic Biology

Scientific advances over the past several decades have accelerated the ability to engineer existing organisms and to potentially create novel ones not found in nature. Synthetic biology, which collectively refers to concepts, approaches, and tools that enable the modification or creation of biological organisms, is being pursued overwhelmingly for beneficial purposes ranging from reducing the burden of disease to improving agricultural yields to remediating pollution. Although the contributions synthetic biology can make in these and other areas hold great promise, it is also possible to imagine malicious uses that could threaten U.S. citizens and military personnel. Making informed decisions about how to address such concerns requires a realistic assessment of the capabilities that could be misused.

Biodefense in the Age of Synthetic Biology explores and envisions potential misuses of synthetic biology. This report develops a framework to guide an assessment of the security concerns related to advances in synthetic biology, assesses the levels of concern warranted for such advances, and identifies options that could help mitigate those concerns.

Environmental Engineering for the 21st Century

Addressing Grand Challenges (2018)

Environmental engineers support the well-being of people and the planet in areas where the two intersect. Over the decades the field has improved countless lives through innovative systems for delivering water, treating waste, and preventing and remediating pollution in air, water, and soil. These achievements are a testament to the multidisciplinary, pragmatic,

systems-oriented approach that characterizes environmental engineering. Environmental Engineering for the 21st Century: Addressing Grand Challenges outlines the crucial role for environmental engineers in this period of dramatic growth and change. The report identifies five pressing challenges of the 21st century that environmental engineers are uniquely poised to help advance: sustainably supply food, water, and energy; curb climate change and adapt to its impacts; design a future without pollution and waste; create efficient, healthy, resilient cities; and foster informed decisions and actions. **Presentation Slides**.

Future Water Priorities for the Nation: Directions for the U.S. Geological Survey Water Mission Area

Solving problems related to use of water resources will be of paramount importance in coming decades as increasing pressure from growing populations, climate change, extreme weather, and aging water-related infrastructure threaten water availability and quality. The Water Mission Area (WMA) of the U.S. Geological Survey (USGS) has a long-established reputation for collecting and delivering high-quality, unbiased scientific information related to the nation's water resources. WMA observations help inform decisions ranging from rapid responses during emergencies such as hurricanes, floods, and forest fires, to the long-term management of water resources. Produced at the request of USGS, this report identifies the nation's highest-priority water science and resources challenges over the next 25 years. Future Water Priorities for the Nation summarizes WMA's current water science and research portfolio, and recommends strategic opportunities for WMA to more effectively address the most pressing challenges.

New Funding Opportunities

(Back to Page 1)

Content Order

New Funding Posted Since November 15 Newsletter
URL Links to New & Open Funding Solicitations
Solicitations Remaining Open from Prior Issues of the Newsletter
Open Solicitations and BAAs

[User Note: URL links are active on date of publication, but if a URL link breaks or changes a Google search on the key words will typically take you to a working link. Also, entering a grant title and/or solicitation number in the Grants.gov search box will work as well.]

New Funding Solicitations Posted Since November 15 Newsletter

DE-FOA-0001905: Energy-Water Desalination Hub
https://www.grants.gov/web/grants/search-grants.html?keywords=DE-FOA-0001905%20%20
The Office of Energy Efficiency and Renewable Energy (EERE), within the U.S. Department of Energy (DOE), invests in cutting-edge research, development, and demonstration activities focused on sustainable transportation, renewable power, and energy efficiency. Through EERE's Advanced Manufacturing Office (AMO) public-private R&D consortia, manufacturers, small businesses, universities, national laboratories, and state and local governments are brought together to pursue coordinated early-stage R&D in high-priority areas essential to energy in manufacturing. Federal funding is the catalyst to bring stakeholders into shared spaces and to address process and technological challenges that present a significant degree of scientific or technical uncertainty.
The purpose of this funding opportunity announcement (FOA) is to establish an Energy Innovation Hub (referred to hereafter as the Energy-Water Desalination Hub, or the Hub) to address water security issues in the U.S. For the purpose of this FOA, "desalination" more broadly includes technologies that primarily remove salts. The Hub is a critical component of the Department of Energy's (DOE) broader Water Security Grand Challenge which will use a coordinated suite of prizes, competitions, early stage research and development (R&D), and other programs to help address the nation's water security needs.

The Energy-Water Desalination Hub will be organized around four topic areas: 1) Materials Research and Development, 2) New Process Research and Development, 3) Modeling and Simulation Tools, and 4) Integrated Data and Analysis. DOE intends to select and fund one application with the greatest likelihood of achieving the goals of all four topics of this FOA. **Please carefully review the complete Funding Opportunity Announcement, which can be accessed under the "DOCUMENTS" heading below.**

Please click "FOA FAQs" under the "DOCUMENTS" heading below for Questions and Answers specific to this FOA.

Applicants that experience issues with submissions PRIOR to the FOA Deadline: The Exchange system is currently designed to enforce hard deadlines for Full Application submissions. The APPLY and SUBMIT buttons automatically disable at the defined submission deadlines. The intention of this design is to consistently enforce a standard deadline for all applications. In the event that an Applicant experiences technical difficulties with a submission, the Applicant should contact the Exchange helpdesk for assistance (EERE-ExchangeSupport@hq.doe.gov).

Informational Webinar: The Informational Webinar mentioned in the FOA will be held on January 7, 2019 at 3:00 PM Eastern Standard Time. Attendance is not mandatory and will not positively or negatively impact the overall review of any Applicant submissions. Standard application questions regarding the EERE Office and FOA procedures will be discussed. No new information will be presented during the webinar and EERE will not answer any attendee questions during the webinar.

After the webinar is complete, a link will be provided to access the audio recording of the webinar. Also, a copy of the Webinar Slides and Webinar Transcript will be available to download in the "DOCUMENTS" section below.

Please click here to register for the webinar.

Documents

- FOA FAQs (Last Updated: 9/4/2018 05:02 PM ET)
- DE-FOA-0001905 Energy-Water Desalination Hub FOA (Last Updated: 12/12/2018 05:52 PM ET)

Concept Paper Submission Deadline: 2/7/2019 5:00 PM ET
Full Application Submission Deadline: 5/7/2019 5:00 AM ET

NSF Campus Cyberinfrastructure

The Campus Cyberinfrastructure (CC*) program invests in coordinated campus-level networking and cyberinfrastructure improvements, innovation, integration, and engineering for science applications and distributed research projects. Learning and workforce development (LWD) in cyberinfrastructure is explicitly addressed in the program. Science-driven requirements are the primary motivation for any proposed activity. **Due February 20**.

Biotechnology Risk Assessment Research Grants Program (BRAG)

The purpose of the BRAG program is to support the generation of new information that will assist Federal regulatory agencies in making science-based decisions about the effects of introducing into the environment genetically engineered organisms (GE), including plants, microorganisms — such as fungi, bacteria, and viruses — arthropods, fish, birds, mammals and other animals excluding humans. Investigations of effects on both managed and natural environments are relevant. The BRAG program accomplishes its purpose by providing federal regulatory agencies with scientific information relevant to regulatory issues. See the Request for Applications (RFA) for details. View the Centers of Excellence (COE) webpage to access a factsheet on the COE designation process, including COE criteria, and a list of programs offering COE opportunities. **Due February 20**.

NSF Dimensions of Biodiversity

The 2019 Dimensions of Biodiversity program is restricted to projects supported by international partnerships with the National Natural Science Foundation of China (NSFC), the São Paulo Research Foundation (FAPESP) of Brazil, and the National Research Foundation (NRF) of South Africa. Proposals are to be submitted jointly, with the US PIs submitting to NSF and the collaborating Chinese, Brazilian, or South African PIs submitting to their appropriate national funding agencies. **Due February 28**.

Future of Work at the Human-Technology Frontier: Core Research (FW-HTF)

The specific objectives of the Future of Work at the Human-Technology Frontier program are (1) to facilitate convergent research that employs the joint perspectives, methods, and knowledge of computer science, engineering, learning sciences, research on education and workforce training, and social, behavioral, and economic sciences; (2) to encourage the development of a research community dedicated to designing intelligent technologies and work organization and modes inspired by their positive impact on individual workers, the work at hand, the way people learn and adapt to technological change, creative and supportive workplaces (including remote locations, homes, classrooms, or virtual spaces), and benefits for social, economic, and environmental systems at different scales; (3) to promote deeper basic understanding of the interdependent human-technology partnership to advance societal needs by advancing design of intelligent work technologies that operate in harmony with human workers, including consideration of how adults learn the new skills needed to interact with these technologies in the workplace, and by enabling broad workforce participation, including improving accessibility for those challenged by physical or cognitive impairment; and (4) to understand, anticipate, and explore ways of mitigating potential risks arising from future work at the human-technology frontier. **Due March 6.**

Improving Undergraduate STEM Education: Hispanic-Serving Institutions (HSI Program)

The Improving Undergraduate STEM Education: Hispanic-Serving Institutions (HSI Program) seeks to enhance the quality of undergraduate STEM education at HSIs and to increase retention and graduation rates of undergraduate students pursuing degrees in science, technology, engineering, and mathematics (STEM) at HSIs. In addition, the HSI Program seeks to build capacity in undergraduate STEM education at HSIs that typically do not receive high levels of NSF grant funding. The National Science Foundation (NSF) established the HSI Program in response to the Consolidated Appropriations Act, 2017 (P.L. 115-31) and the American Innovation and Competitiveness Act (P.L. 114-329). The HSI Program is aligned with NSF's commitment to increase access for underrepresented groups to the Nation's STEM enterprise. In designing the HSI Program, NSF sought community input by several mechanisms (https://nsf.gov/ehr/HSIProgramPlan.jsp) and has continued to gather community input to inform future components of, or modifications to, the HSI Program. **Webinar.** The HSI Program team, in collaboration with the NSF Division of Grants and Agreement (DGA), will host webinars after the release of this solicitation. Key features and expectations of the HSI Program as well as guidance on proposal preparation and submission will be discussed with potential PIs and their authorized organizational representatives responsible for submitting proposals to the HSI Program. Information regarding the webinar will be posted to the HSI Program webpage: https://nsf.gov/ehr/HSIProgramPlan.jsp. **Due March 6.**

Harnessing the Data Revolution (HDR): Institutes for Data-Intensive Research in Science and Engineering - Ideas Labs

In 2016, the National Science Foundation (NSF) unveiled a set of "Big Ideas," 10 bold, long-term research and process ideas that identify areas for future investment at the frontiers of science and engineering (see https://www.nsf.gov/news/special_reports/big_ideas/index.jsp). The Big Ideas represent unique opportunities to position our Nation at the cutting edge of global science and engineering leadership by bringing together diverse disciplinary perspectives to support convergence research. As such, when responding to this solicitation, even though proposals must be submitted to the Directorate for Computer & Information Science & Engineering/Office of Advanced Cyberinfrastructure(CISE/OAC), once received, the proposals will be managed by a cross-disciplinary team of NSF Program Directors. NSF's Harnessing the Data Revolution (HDR) Big Idea is a national-scale activity to enable new modes of data-driven discovery that will allow fundamental questions to be asked and answered at the frontiers of science and engineering. Through this NSF-wide activity, HDR will generate new knowledge and understanding, and accelerate discovery and innovation. The HDR vision is realized through an interrelated set of efforts in:

- Foundations of data science;
- Algorithms and systems for data science;
- Data-intensive science and engineering;
- Data cyberinfrastructure; and
- Education and workforce development.

Each of these efforts is designed to amplify the intrinsically multidisciplinary nature of the emerging field of data science. The HDR Big Idea will establish theoretical, technical, and ethical frameworks that will be applied to tackle data-intensive problems in science and engineering, contributing to data-driven decision-making that impacts society. This solicitation describes one or more Ideas Lab(s) on Data-Intensive Research in Science and Engineering (DIRSE) as part of the HDR Institutes activity. **Due June 19**.

URL Links to New & Open Funding Solicitations

Links verified June 8, 2018

- **SAMHSA FY 2017 Grant Announcements and Awards**
- **Open Solicitations from IARPA (Intelligence Advanced Research Projects Activity)**
- **Bureau of Educational and Cultural Affairs, Open Solicitations, DOS**
- **ARPA-E Funding Opportunity Exchange**
- **DOE Funding Opportunity Exchange**
- **NPS Broad Agency Announcements (BAAs)**
- **NIJ Current Funding Opportunities**
- **NIJ Forthcoming Funding Opportunities**
- **Engineering Information Foundation Grant Program**
- **Comprehensive List of Collaborative Funding Mechanisms, NORDP**
- **ARL Funding Opportunities — Open Broad Agency Announcements (BAA)**
- **NASA Open Solicitations**

- CDMRP FY 2018 Funding Announcements
- DOE/EERE Funding Opportunity Exchange
- New Funding Opportunities at NIEHS (NIH)
- National Human Genome Research Institute Funding Opportunities
- Office of Naval Research Currently Active BAAs
- HRSA Health Professions Open Opportunities
- Foundation Center RFP Weekly Funding Bulletin

Solicitations Remaining Open from Prior Issues of the Newsletter

Harnessing the Data Revolution (HDR): Data Science Corps (DSC) Building Capacity for HDR

NSF's Harnessing the Data Revolution (HDR) Big Idea is a visionary, national-scale activity to enable new modes of data-driven discovery, allowing fundamentally new questions to be asked and answered in science and engineering frontiers, generating new knowledge and understanding, and accelerating discovery and innovation. The HDR vision is realized via a coordinated set of program solicitations resulting in an ecosystem of interrelated activities enabling (i) research in the foundations of data science; frameworks, algorithms, and systems for data science; and data-driven research in science and engineering; (ii) advanced cyberinfrastructure; and (iii) education and workforce development—all of which are designed to amplify the intrinsically multidisciplinary nature of the data science challenge. The HDR Big Idea will establish theoretical, technical, and ethical data science frameworks, and apply them to practical problems in science and engineering, and in society more generally.

The Data Science Corps is one of the components of the HDR ecosystem, focusing on building capacity for harnessing the data revolution at the local, state, national, and international levels to help unleash the power of data in the service of science and society. The Data Science Corps will provide practical experiences, teach new skills, and offer teaching opportunities, in a variety of settings, to data scientists and data science students. It will also strive to promote data literacy and provide basic training in data science to the existing workforce across communities. As a first step in establishing the Data Science Corps, this solicitation focuses specifically on enabling participation by undergraduate students in the Data Science Corps, by supporting student stipends for participation in data science projects and supporting integration of real-world data science projects into classroom instruction.
Submission Window January 28, 2019 - February 04, 2019.

Materials Innovation Platforms (MIP)

Materials Innovation Platforms (MIP) is a mid-scale infrastructure program in the Division of Materials Research (DMR) designed to accelerate advances in materials research. MIPs respond to the increasing complexity of materials research that requires close collaboration of interdisciplinary and transdisciplinary teams and access to cutting edge tools. These tools in a user facility benefit both a user program and in-house research, which focus on addressing grand challenges of fundamental science and meet national needs. MIPs embrace the paradigm set forth by the Materials Genome Initiative (MGI), which strives to "discover, manufacture, and deploy advanced materials twice as fast, at a fraction of the cost," and conduct research through iterative "closed-loop" efforts among the areas of materials synthesis/processing,

materials characterization, and theory/modeling/simulation. In addition, they are expected to engage the emerging field of data science in materials research. Each MIP is a scientific ecosystem, which includes in-house research scientists, external users and other contributors who, collectively, form a community of practitioners and share tools, codes, samples, data and know-how. The knowledge sharing is designed to strengthen collaborations among scientists and enable them to work in new ways, fostering new modalities of research and education/training, for the purpose of accelerating discovery and development of new materials and novel materials phenomena/properties, as well as fostering their eventual deployment. The scientific focus of the MIP program is subject to change from competition to competition. The first MIP competition in 2015 focused on developing new bulk and thin-film crystalline hard materials. **The second MIP competition, in 2019, focuses on the convergence of materials research with biological sciences for developing new materials**. **Due February 4.**

Training-based Workforce Development for Advanced Cyberinfrastructure (CyberTraining)

The revisions are as follows:

•Three project classes have been defined: Pilot, Implementation (Small or Medium), and Large-scale Project Conceptualization.

•The two solicitation goals have been clarified, and Pilot and Implementation projects may target one or both of the solicitation goals. Large-scale Project Conceptualization projects must address both goals.

•Separate submission tracks for Cyberinfrastructure Contributors, Users, and Professionals have been eliminated. However, there remains a focus on these scientific communities, and projects should target one or more of these communities.

•The limit on number or proposals per PI or co-PI has been updated to indicate an individual may serve as PI or co-PI on only one Pilot or Implementation proposal to the CyberTraining program per competition. The Large-scale Project Conceptualization projects are not included in this limit.

•The programmatic areas of interest have been updated with the current priorities of the participating directorates and divisions, with one additional directorate participating: the Directorate for Social, Behavioral and Economic Sciences (SBE).

•The list of additional solicitation specific review criteria has been updated. Proposals should address a subset of these criteria according to the project class and one or both chosen goal(s) of the solicitation.

This program seeks to prepare, nurture, and grow the national scientific research workforce for creating, utilizing, and supporting advanced cyberinfrastructure (CI) to enable and potentially transform fundamental science and engineering research and contribute to the Nation's overall economic competitiveness and security. The goals of this solicitation are to (i) ensure broad adoption of CI tools, methods, and resources by the research community in order to catalyze major research advances and to enhance researchers' abilities to lead the development of new CI; and (ii) integrate core literacy and discipline-appropriate advanced skills in advanced CI as well as computational and data-driven science and engineering into the Nation's educational curriculum/instructional material fabric spanning undergraduate and graduate courses for advancing fundamental research. Pilot and Implementation projects may target one or both of the solicitation goals, while Large-scale Project Conceptualization projects

must address both goals. For the purpose of this solicitation, advanced CI is broadly defined as the set of resources, tools, methods, and services for advanced computation, large-scale data handling and analytics, and networking and security for large-scale systems that collectively enable potentially transformative fundamental research. **Due February 6.**

Enabling Discovery through GEnomic Tools National Science Foundation

The Division of Integrative Organismal Systems (IOS) recognizes that a lack of methods for analysis of gene function represents an obstacle to progress in a range of diverse non-model organisms. These organisms are important for understanding numerous basic science questions in organismal biology as funded through the Division's core programs. Enabling Discovery through Genomic Tools (EDGE) is designed to provide support for development of tools, approaches and infrastructure necessary for direct tests of cause and effect hypotheses between gene function and phenotypes in diverse plants, animals, microbes, viruses and fungi for which these methods are presently unavailable. Such approaches are essential to advance understanding of the genomes-to-phenomes relationship, an area relevant to Understanding the Rules of Life: Predicting Phenotype, one of the 10 Big Ideas for future NSF investment. To meet the goal of catalyzing communities to enable direct tests of cause-and-effect hypotheses about genes and phenotypes in organisms for which such tools and infrastructure are presently lacking, EDGE proposals must include training and rapid dissemination plans enabling larger communities of investigators to utilize the newly-developed tools quickly, thereby catalyzing an increase in the capacity of research communities to test cause-and-effect hypotheses about genes and phenotypes in organisms for which such tools and infrastructure are presently lacking. **Due February 12.**

DE-FOA-0001913 Fiscal Year 2019 Consolidated Innovative Nuclear Research

This FOA is open to U.S. universities, national laboratories, and industry. Research consortiums may be composed of diverse institutions including academia, national laboratories, non-profit research institutes, industry/utilities, and international partners. Research teams should strive to achieve the synergies that arise when individuals with forefront expertise in different methodologies, technologies, disciplines, and areas of content knowledge approach a problem together, overcoming impasses by considering the issue from fresh angles and discovering novel solutions. DOE-NE strongly encourages diversifying its research portfolio through effective partnerships with industry, underrepresented groups, and MSI, which may receive funding support from the project. International partners are encouraged to participate, however no U.S. government funding will be provided to entities incorporated outside of the United States. DOE-NE will evaluate the benefit and contribution of any such proposed partnerships as part of its program relevancy evaluation and scoring. See eligibility requirements in the body of the FOA document to be sure you can apply. **Due Feb. 12.**

NOAA-OAR-OWAQ-2019-2005820 FY2019 Office of Weather and Air Quality Research Programs

There will be eight grant competitions from this notification valued at approximately $16,200,000 as follows: 1) High Impact Weather Testbeds, 2) Joint Technology Transfer Initiative (JTTI), 3) Air Quality Research and Forecasting, 4) Verification of the Origins of

Rotation in Tornadoes Experiment - Southeast U.S. (VORTEX-SE), 5) Infrasound Detection of Tornadoes and High Impact Weather, 6) Next Generation of Mesoscale Weather Observing Platforms, 7) Snowpack and Soil Moisture Observations and Data Assimilation to Improve the National Water Model (NWM), and 8) Subseasonal to Seasonal (S2S).

These eight competitions in this notification of funding opportunity reflect multiple science objectives spanning time scales from the very short-term (hours) to seasonal and from weather and water observations and modeling to social and behavioral science. It is focused on improving NOAA's understanding and ultimately its weather and water forecasting services through engagement with the external scientific community on key science gaps of mutual interest through funded grant opportunities.

One of the key themes is supporting applied research and development that leads to the demonstration in NOAA's testbeds during the project period of new high impact weather, water, and air quality observing and forecasting applications, including new data or products, improved analysis techniques, better statistical or dynamic forecast models and techniques, and communication of that information to better inform the public. It is expected that NOAA's support of these new capabilities will speed the transition of this new research into operations in order to improve NOAA weather and water services for the public. **Due March 20**.

Materials Research Science and Engineering Centers (MRSEC)

There are a few minor differences between this and the previous (NSF 16-545) solicitation. These include:

1. Interdisciplinary Research Groups topics focusing on the NSF Big Ideas are included as suggested research topics;
2. For both preliminary and full proposals, MRSEC participant definitions are clarified and made uniform: it changed from using senior investigator, senior participants and others to clearer definitions for supported and unsupported Participants including Primary and Secondary Participants and more (see text);
3. For Preliminary proposals, only biographical sketches for those individuals listed in the NSF Proposal Cover Sheet (up to five) are required; other biographical sketches will not be accepted;
4. For both Preliminary and Full Proposal, Results from Prior NSF Support can only be reported for individuals, up to five, that appear on the NSF Cover Sheet; results for other participants must not be included;
5. Proposers are encouraged to contact the Program Director(s) prior to submission to ascertain that the Interdisciplinary Research Group (IRG) proposed research fits the Division of Materials Research (DMR) portfolio.

The Materials Research Science and Engineering Centers (MRSECs) program provides sustained support of interdisciplinary materials research and education of the highest quality while addressing fundamental problems in science and engineering. Each MRSEC addresses research of a scope and complexity requiring the scale, synergy, and multidisciplinarity provided by a campus-based research center. The MRSECs support materials research infrastructure in the United States, promote active collaboration between universities and other sectors, including industry and international organizations, and contribute to the development of a national

network of university-based centers in materials research, education, and facilities. A MRSEC may be located at a single institution, or may involve multiple institutions in partnership, and is composed of up to three Interdisciplinary Research Groups, IRGs, each addressing a fundamental materials science topic aligned with the Division of Materials Research, DMR. **Preliminary due June 24; full by invitation November 26.**

Open Solicitations and BAAs

[BAA's remain open for one or more years. During the open period, agency research priorities may change or other modifications are made to a published BAA. If you are submitting a proposal in response to an open solicitation, as below, check for modifications to the BAA at Grants.gov or by utilizing Modified Opportunities by Agency to receive a Grants.gov notification of recently modified opportunities by agency name.]

FA9550-18-S-0003 Research Interests of the Air Force Office of Scientific Research
AFOSR plans, coordinates, and executes the Air Force Research Laboratory's (AFRL) basic research program in response to technical guidance from AFRL and requirements of the Air Force. Additionally, the office fosters, supports, and conducts research within Air Force, university, and industry laboratories; and ensures transition of research results to support U.S. Air Force needs. The focus of AFOSR is on research areas that offer significant and comprehensive benefits to our national war fighting and peacekeeping capabilities. These areas are organized and managed in two scientific Departments: Engineering and Information Science (RTA) and Physical and Biological Sciences (RTB). The research activities managed within each Department are summarized in this section. **Open Until Superseded**.

PAR-16-242 Bioengineering Research Grants (BRG) (R01) Department of Health and Human Services National Institutes of Health
The purpose of this funding opportunity announcement is to encourage collaborations between the life and physical sciences that: 1) apply a multidisciplinary bioengineering approach to the solution of a biomedical problem; and 2) integrate, optimize, validate, translate or otherwise accelerate the adoption of promising tools, methods and techniques for a specific research or clinical problem in basic, translational, or clinical science and practice. An application may propose design-directed, developmental, discovery-driven, or hypothesis-driven research and is appropriate for small teams applying an integrative approach to increase our understanding of and solve problems in biological, clinical or translational science. **Open to May 9, 2019.**

BAA-RQKD-2014-0001 Open Innovation and Collaboration Department of Defense Air Force -- Research Lab
Open innovation is a methodology to capitalize on diverse, often non-traditional talents and insights, wherever they reside, to solve problems. Commercial industry has proven open innovation to be an effective and efficient mechanism to overcome seemingly impossible technology and/or new product barriers. AFRL has actively and successfully participated in collaborative open innovation efforts. While these experiences have demonstrated the power of open innovation in the research world, existing mechanisms do not allow AFRL to rapidly

enter into contractual relationships to further refine or develop solutions that were identified. This BAA will capitalize on commercial industry experience in open innovation and the benefits already achieved by AFRL using this approach. This BAA will provide AFRL an acquisition tool with the flexibility to rapidly solicit proposals through Calls for Proposals and make awards to deliver innovative technical solutions to meet present and future compelling Air Force needs as ever-changing operational issues become known. The requirements, terms and specific deliverables of each Call for Proposals will vary depending on the nature of the challenge being addressed. It is anticipated that Call(s) for Proposals will address challenges in (or the intersection between) such as the following technology areas: Materials: - Exploiting material properties to meet unique needs - Material analysis, concept / prototype development, and scale up Manufacturing Processes that enable affordable design, production and sustainment operations Aerospace systems: - Vehicle design, control, and coordinated autonomous and/or manned operations - Power and propulsion to enable next generation systems Human Effectiveness: - Methods and techniques to enhance human performance and resiliency in challenging environments - Man – Machine teaming and coordinated activities Sensors and Sensing Systems: - Sensor and sensing system concept development, design, integration and prototyping - Data integration and exploitation. **Open to July 12, 2019.**

HDTRA1-14-24-FRCWMD-BAA Fundamental Research to Counter Weapons of Mass Destruction

** Fundamental Research BAA posted on 20 March 2015.** Potential applicants are strongly encouraged to review the BAA in its entirety. **Please note that ALL general correspondence for this BAA must be sent to HDTRA1-FRCWMD-A@dtra.mil. Thrust Area-specific correspondence must be sent to the applicable Thrust Area e-mail address listed in Section 7: Agency Contacts.** **Open to Sept. 30, 2019.**

BAA-RQKH-2015-0001 Methods and Technologies for Personalized Learning, Modeling and Assessment Air Force -- Research Lab

The Air Force Research Laboratories and 711th Human Performance Wing are soliciting white papers (and later technical and cost proposals) on the following research effort. This is an open ended BAA. The closing date for submission of White Papers is 17 Nov 2019. This program deals with science and technology development, experimentation, and demonstration in the areas of improving and personalizing individual, team, and larger group instructional training methods for airmen. The approaches relate to competency definition and requirements analysis, training and rehearsal strategies, and models and environments that support learning and proficiency achievement and sustainment during non-practice of under novel contexts. This effort focuses on measuring, diagnosing, and modeling airman expertise and performance, rapid development of models of airman cognition and specifying and validating, both empirically and practically, new classes of synthetic, computer-generated agents and teammates. An Industry Day was held in November 2014. Presentation materials from the Industry Day and Q&A's are attached. If you would like a list of Industry Day attendees, send an email request to helen.williams@us.af.mil **Open until November 17, 2019.**

BAA-AFRL-RQKMA-2016-0007 Air Force Research Laboratory, Materials & Manufacturing Directorate, Functional Materials and Applications (AFRL/RXA) Two-Step Open BAA

Air Force Research Laboratory, Materials & Manufacturing Directorate is soliciting White Papers and potentially technical and cost proposals under this two-step Broad Agency Announcement (BAA) that is open for a period of five (5) years. Functional Materials technologies that are of interest to the Air Force range from materials and scientific discovery through technology development and transition, and support the needs of the Functional Materials and Applications mission. Descriptors of Materials and Manufacturing Directorate technology interests are presented in the context of functional materials core technical competencies and applications. Applicable NAICS codes are 541711 and 541712. **Open to April 20, 2021.**

Army Research Office Broad Agency Announcement for Basic and Applied Scientific Research

This BAA sets forth research areas of interest to the ARO. This BAA is issued under FAR 6.102(d)(2), which provides for the competitive selection of basic and applied research proposals, and 10 U.S.C. 2358, 10 U.S.C. 2371, and 10 U.S.C. 2371b, which provide the authorities for issuing awards under this announcement for basic and applied research. The definitions of basic and applied research may be found at 32 CFR 22.105.Proposals submitted in response to this BAA and selected for award are considered to be the result of full and open competition and in full compliance with the provision of Public Law 98-369, "The Competition in Contracting Act of 1984" and subsequent amendments. **Open to April 30, 2022**.

FA9453-17-S-0005 Research Options for Space Enterprise Technologies (ROSET)

The Air Force Research Laboratory (AFRL) Space Vehicle Directorate (RV) is interested in receiving proposals from all offerors to advance state of the art technology and scientific knowledge supporting all aspects of space systems including payload adapters, on-orbit systems, communications links, ground systems, and user equipment. Efforts will include basic and advanced research, advanced component and technology development, prototyping, and system development and demonstration and will span the range from concept and laboratory experimentation to testing/demonstration in a relevant environment. Specific tasks include design, development, analysis, fabrication, integration, characterization, testing/experimentation, and demonstration of hardware and software products. **Open to September 22, 2022.**

Broad Agency Announcement for the Army Rapid Capabilities Office

This Broad Agency Announcement (BAA), W56JSR-18-S-0001, is sponsored by the Army Rapid Capabilities Office (RCO). The RCO serves to expedite critical capabilities to the field to meet Combatant Commanders' needs. The Office enables the Army to experiment, evolve, and deliver technologies in real time to address both urgent and emerging threats while supporting acquisition reform efforts. The RCO executes rapid prototyping and initial equipping of capabilities, particularly in the areas of cyber, electronic warfare, survivability and positioning, navigation and timing (PNT), as well as other priority projects that will enable Soldiers to operate and win in contested environments decisively. This BAA is an expression of interest only and does not commit the Government to make an award or pay proposal preparation costs generated in response to this announcement.

Questions concerning the receipt of your submission should be directed: http://rapidcapabilitiesoffice.army.mil/eto/

Technical questions will be sent to the appropriate Technical Points of Contact (TPOC), topic authors, and/or Subject Matter Experts (SMEs) to request clarification of their areas of interest. No discussions are to be held with offerors by the technical staff after proposal submission without permission of the Army Contracting Command-Aberdeen Proving Ground (ACC-APG) Contracting Officer. **Open to March 23, 2023.**

W911NF-18-S-0005 U.S. Army Research Institute for the Behavioral and Social Sciences Broad Agency Announcement for Basic, Applied, and Advanced Research (Fiscal Years 2018-2023)

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) announces the ARI FY18-23 Broad Agency Announcement for Basic, Applied, and Advanced Scientific Research. This Broad Agency Announcement, which sets forth research areas of interest to the United States Army Research Institute for the Behavioral and Social Sciences, is issued under the provisions of paragraph 6.102(d)(2) of the Federal Acquisition Regulation (FAR), which provides for the competitive selection of proposals. Proposals submitted in response to this BAA and selected for award are considered to be the result of full and open competition and in full compliance with the provisions of Public Law 98-369 (The Competition in Contracting Act of 1984) and subsequent amendments. The U.S. Army Research Institute for the Behavioral and Social Sciences is the Army's lead agency for the conduct of research, development, and analyses for the improvement of Army readiness and performance via research advances and applications of the behavioral and social sciences that address personnel, organization, training, and leader development issues. Programs funded under this BAA include basic research, applied research, and advanced technology development that can improve human performance and Army readiness.

Those contemplating submission of a proposal are encouraged to contact the ARI Technical Point of Contact (TPOC) for the respective topic area cited in the BAA. If the R&D warrants further inquiry and funding is available, submission of a proposal will be entertained. The recommended three-step sequence is (1) telephone call to the ARI TPOC or responsible ARI Manager, (2) white paper submission, (3) full proposal submission. Awards may be made in the form of contracts, grants, or cooperative agreements. Proposals are sought from educational institutions, non-profit/not-for-profit organizations, and commercial organizations, domestic or foreign, for research and development (R&D) in those areas specified in the BAA. The U.S. Army Research Institute for the Behavioral and Social Sciences encourages Historically Black Colleges and Universities/Minority Serving Institutions (HBCU/MSI) and small businesses to submit proposals for consideration. Foreign owned, controlled, or influenced organizations are advised that security restrictions may apply that could preclude their participation in these efforts. Government laboratories, Federal Funded Research and Development Centers (FFRDCs), and US Service Academies are not eligible to participate as prime contractors or recipients. However, they may be able to participate as subcontractors or Subrecipients (eligibility will be determined on a case by case basis). **Open to April 29, 2023.**

FA8650-17-S-6001 Science and Technology for Autonomous Teammates (STAT)

The objective of Science and Technology for Autonomous Teammates (STAT) program is to develop and demonstrate autonomy technologies that will enable various AF mission sets. This research will be part of Experimentation Campaigns in: 1 -Multi-domain Command and Control; 2-Intelligence, Surveillance, Recognizance (ISR) Processing Exploitation and Dissemination (PED); and 3- Manned-Unmanned combat Teaming to demonstrate autonomy capabilities to develop and demonstrate autonomy technologies that will improve Air Force operations through human-machine teaming and autonomous decision-making. The technology demonstrations that result from this BAA will substantially improve the Air Force's capability to conduct missions in a variety of environments while minimizing the risks to Airmen. The overall impact of integration of autonomous systems into the mission space will enable the Air Force to operate inside of the enemy's decision loop.

STAT will develop and apply autonomy technologies to enhance the full mission cycle, including mission planning, mission execution, and post-mission analysis. Particular areas of interest include multi-domain command and control, manned-unmanned teaming, and information analytics. The technology demonstrations that result from this BAA will substantially improve the Air Force's capability to conduct missions in a variety of environments while minimizing the risks to Airmen. The overall impact of integration of autonomous systems into the mission space will enable the Air Force to operate inside of the enemy's decision loop. This effort plans to demonstrate modular, transferable, open system architectures, and deliver autonomy technologies applicable to a spectrum of multi-domain applications. Development efforts will mature a set of technologies that enable airmen to plan, command, control, and execute missions with manageable workloads. The software algorithms and supporting architectures shall:• Ingest and understand mission taskings and commander's intent• Respond appropriately to human direction and orders• Respond intelligently to dynamic threats and unplanned events Chosen technologies will be open, reusable, adaptable, platform agnostic, secure, credible, affordable, enduring, and able to be integrated into autonomous systems. The program will be comprised of various technologies developed by AFRL and Industry, integrated into technology demonstrations and deliverables with all the necessary software, hardware, and documentation to support AFRL-owned modeling and simulation environments for future capability developments. Thus, all technology development efforts must adhere to interface designs and standards. **Open to July 23, 2023**.

Academic Research Funding Strategies, LLC (Page 1)

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